REMARKS

INTRODUCTION

Claims 1-5 were previously pending and under consideration.

Claims 3 and 4 have been cancelled.

Claims 6-8 have been added.

Therefore, claims 1-2 and 5-8 are now pending and under consideration.

Claims 1, 2 and 5 stand rejected.

Claim 5 has been objected to.

Claims 1-2 and 5 have been amended herein.

No new matter is being presented, and approval and entry are respectfully requested.

OBJECTIONS TO THE DRAWINGS

In the Office Action, at page 2, the drawings were objected to. Figures 2 and 5 have been labeled "Prior Art".

Withdrawal of the outstanding objections to the drawings is respectfully requested.

REJECTION UNDER 35 USC § 112, FIRST PARAGRAPH

In the Office Action, claim 5 was rejected under 35 U.S.C. § 112, first paragraph. No reasons were set forth. Withdrawal of the rejection is respectfully requested.

REJECTIONS UNDER 35 USC § 102

In the Office Action, at pages 5-6, claims 1 and 2 were rejected under 35 U.S.C. § 102 as anticipated by Hong. This rejection is traversed and reconsideration is requested.

DETERMINING ACCELERATION WITH PREDETERMINED SPEED-ACCELERATION CURVE

Claim 1 recites "determining accelerations by, for each cycle in said acceleration and deceleration processing, determining each acceleration in accordance with a speed obtained at a previous processing cycle, such that a speed-acceleration curve generated by movement commands which are made by the acceleration and deceleration processing will lie along a predetermined speed-acceleration curve ... where the predetermined speed-acceleration curve is predetermined before the generated movement commands".

Claim 8 recites "determining accelerations/decelerations ... by, for each cycle in said acceleration/deceleration processing, determining each acceleration/deceleration in accordance with a speed obtained at a previous processing cycle and in accordance with a pre-determined speed-acceleration curve, where the predetermined speed-acceleration curve is set for each axis, and where the predetermined speed-acceleration curve is predetermined before the determining of the accelerations/decelerations".

In other words, an acceleration/deceleration for a command is determined according to a previous cycle's speed and a pre-determined speed-acceleration curve, where the pre-determined speed-acceleration curve has been determined before the determining of the acceleration/deceleration movement commands

In contrast, Hong discusses controlling acceleration only so that a speed change is smooth (see col. 1, lines 20-63, and Figs 1a, 1a', 1c, and 1c'). Furthermore, acceleration is controlled so that an acceleration change is smooth. ("the motor speed controlling method ... produc[es] a speed command profile having an acceleration profile of a *smooth curve* ... so that a robot can be controlled on a real-time basis ... *vibration and noise of the motor are reduced* and thus a control reliability is enhanced", Abstract).

In further contrast, the speed command profile of Hong is calculated *after* a movement command, and is recalculated during each of the movement cycles of the movement command. Referring to Figure 5 of Hong, it is apparent that that step S3 (produce speed command profile) is performed after the operation control S1 and is therefore not predetermined before the movement command. Furthermore, the step S3 is repeated until the target position is reached. Claim 1 recites determining multiple accelerations with the predetermined speed-acceleration curve.

With the present invention, because the speed-acceleration curve is pre-determined *before* the "acceleration and deceleration processing" or the movement commands, it is possible to have a command curve that maximizes the acceleration of the axes. The symmetric approach of Hong cannot produce this advantage.

HONG DOES NOT DISCUSS DIFFERENT ACCELERATION VALUES FOR A GIVEN SPEED MAGNITUDE DEPENDING ON WHETHER AN AXIS IS ACCELERATING OR DECELERATING

Claim 1 recites that "the speed-acceleration curve has different acceleration magnitudes for a given speed magnitude depending on whether an axis is accelerating or deceleration". In other words, for at least some speeds, the mapping between speed and acceleration is dependent on whether the axis is accelerating or decelerating. Hong does not discuss this feature. In contrast, the formulas in Hong for acceleration and deceleration, although unclear, appear to be the same. The only difference between Formula 7 and Formula 8 is the natural omission of initial speed s_i from Formula 8. Otherwise, the formulas for acceleration and deceleration appear to produce the same magnitudes. This understanding is born out, for example, by Figures 6a to 8b of Hong.

CLAIMS 1, 2 AND 5: HONG TEACHINGS NOT ENABLED

The Hong reference is not enabled for its cited teachings. The text discussion of Hong describes a process for smoothing a speed command profile. There is no textual discussion in Hong of the how the speed command profile is generated. The only detail Hong provides for generating a speed command profile is a set of formulas. However, no amount of skill in the art would reveal how to perform the basic teaching of Hong. The formulas in Hong cannot be reconciled with the text discussion in Hong. Consider the following impossibilities that cannot be explained:

1) ΔP_1 is described as "a position change amount", in other words a distance, and current velocity is described as $V_c = \Delta P_1 \times S_m$. It is submitted that a distance (e.g. ΔP_1 in meters) multiplied by a speed (e.g. S_m in meters/second) gives a result in meters^2/second, which is not a velocity.

2) Similarly, Formula (7) is $V_c = \Delta P_1 \times (Aa_0 + [\text{other terms}])$. However, Aa_0 is defined as equal to s_i, which is described as initial speed. It is not possible to multiply a distance (ΔP_1)

by a speed to arrive with a velocity (V_c).

3) Formula (6) defines $TP_i = TP_i$ + [other expression]. How can TP_i be calculated based on itself?

4) Formula (4) describes $T_{acc} = TA_{max} \times |S_m - S_i|$, $|S_m - S_i|$ is a speed, TA_{max} is described as a scalar ("the obtained *number of* acceleration intervals"), and T_{acc} is described as a scalar ("the *number* of acceleration intervals"). It is impossible to derive a *scalar* by multiplying a *speed* with a *scalar*. The formula for T_{dec} is similarly impossible to reconcile.

In sum, nearly every formula and expression in Hong cannot be reconciled with Hong's written description. The descriptions of the variables contradict the operations performed therewith. One of ordinary skill in the art with the specification of Hong would not be able to implement Hong's command speed curve. The only teaching available from Hong is that a symmetric command profile is smoothed to avoid jerky movement and abrupt changes in accelerations. Withdrawal of the rejection of claims 1, 2, and is respectfully requested.

REJECTIONS UNDER 35 USC § 103

In the Office Action, at pages 6-8, claim 5 was rejected under 35 U.S.C. § 103 as being unpatentable over Hong. This rejection is traversed and reconsideration is requested.

HONG DOES NOT DETERMINE ACCELERATION FROM PREVIOUS SPEED

Claim 5 recites reading from memory a predetermined restricted acceleration/deceleration corresponding to the speed of said axis obtained in a previous processing cycle to determine a speed in the present processing cycle using said restricted acceleration/deceleration thus read in the case where said acceleration/deceleration determination means decided that acceleration/deceleration be applied.

In other words, for an acceleration determination, a pre-determined restricted acceleration is read out in correspondence with the speed at the previous processing cycle so that acceleration at the present processing cycle is decided. In this way, acceleration and deceleration will follow the predetermined speed-acceleration curve, which displays the maximum servo ability and obtains the minimum acceleration and deceleration times. As

discussed above, these features are not taught or suggested by Hong.

PERSONAL KNOWLEDGE OF EXAMINER: AFFIDAVIT OR REFERENCE REQUIRED

The rejection of claim 5 is based in part on the personal knowledge of the Examiner. The rejection has not provided evidence that the teaching he proposes actually exists in the prior art. In fact, the reasoning appears to have merely come from Applicant's specification. The personal knowledge of the Examiner, when used as a basis for a rejection, must be supported by an affidavit as to the specifics of the facts of that knowledge when called for by applicant. See, e.g., 37 C.F.R. § 1.104(d)(2). The Examiner is requested to support the rejection with either an affidavit or a reference, or withdraw the rejection.

In support, it is noted that the rejection states "the current acceleration may be viewed simply to be the acceleration while the 'ideal' or 'theoretical' acceleration that is represented by the outputted acceleration curve comprises the 'restricted' aspects of acceleration, as the acceleration should be controlled in a way that optimizes the movement of the acceleration along the acceleration curve". There is no suggestion in the prior art that optimized or ideal acceleration is possible or desirable. It is also suggested that Hong's acknowledged omissions "are believed to be obvious variations of the disclosed system ... the 'restricted acceleration' and 'restricted deceleration' appear to merely provide thresholds or limits *that are reasonably ascertainable by the system*". However, there is no cited prior art reference that supports this conclusion. Even if the unsupported conclusion is true, it may not have been obvious before the present invention. A reference is necessary to support such a rejection.

NEW CLAIMS

New claim 8 is allowable for reasons discussed above. Claim 6 recites "over a sequence of movement cycles for performing the movement instruction, determining a given movement for a cycle by using *the* speed-to-acceleration mapping to map a speed of a previous cycle to an acceleration value and using the acceleration value for the given movement cycle". Hong uses a different recalculated command curve each cycle, and does not map a speed to an acceleration value.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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